Practice!

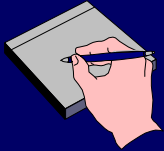*Example*
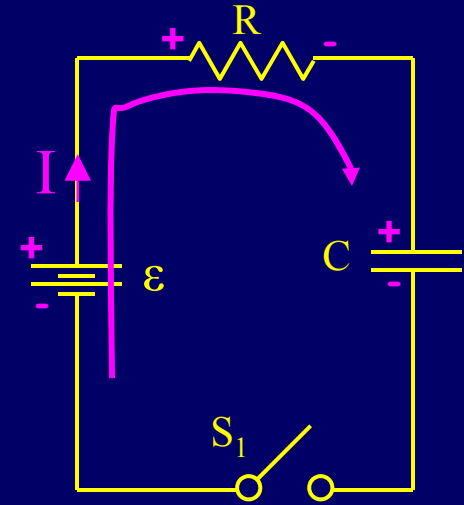
Calculate current immediately after switch is closed:

$$\mathcal{E} - I_0 R - q_0/C = 0$$

$$\mathcal{E} - I_0 R - 0 = 0$$

$$I_0 = \mathcal{E}/R$$

Calculate current after switch has been closed for 0.5 seconds:

$$I = I_0 e^{\frac{-t}{RC}} = \frac{\mathcal{E}}{R} e^{\frac{-0.5}{RC}} = \frac{20}{10} e^{\frac{-0.5}{10 \times 0.03}} = \frac{20}{10} e^{\frac{-0.5}{10 \times 0.03}} = 0.38 \text{ Amps}$$

R=10Ω
C=30 mF
ε =20 Volts

Calculate current after switch has been closed for a long time:

After a long time current through capacitor is zero!

Calculate charge on capacitor after switch has been closed for a long time:

$$\mathcal{E} - IR - q_\infty/C = 0$$

$$\mathcal{E} - 0 - q_\infty /C = 0$$

$$q_\infty = \mathcal{E} C$$